15.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download 3D models of our standard drives at https://configurator.stoeber.de/en-US/.

Combination options and the dimensions of forced ventilated geared motors can also be found at https://configurator.stoeber.de/en-US/.

Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

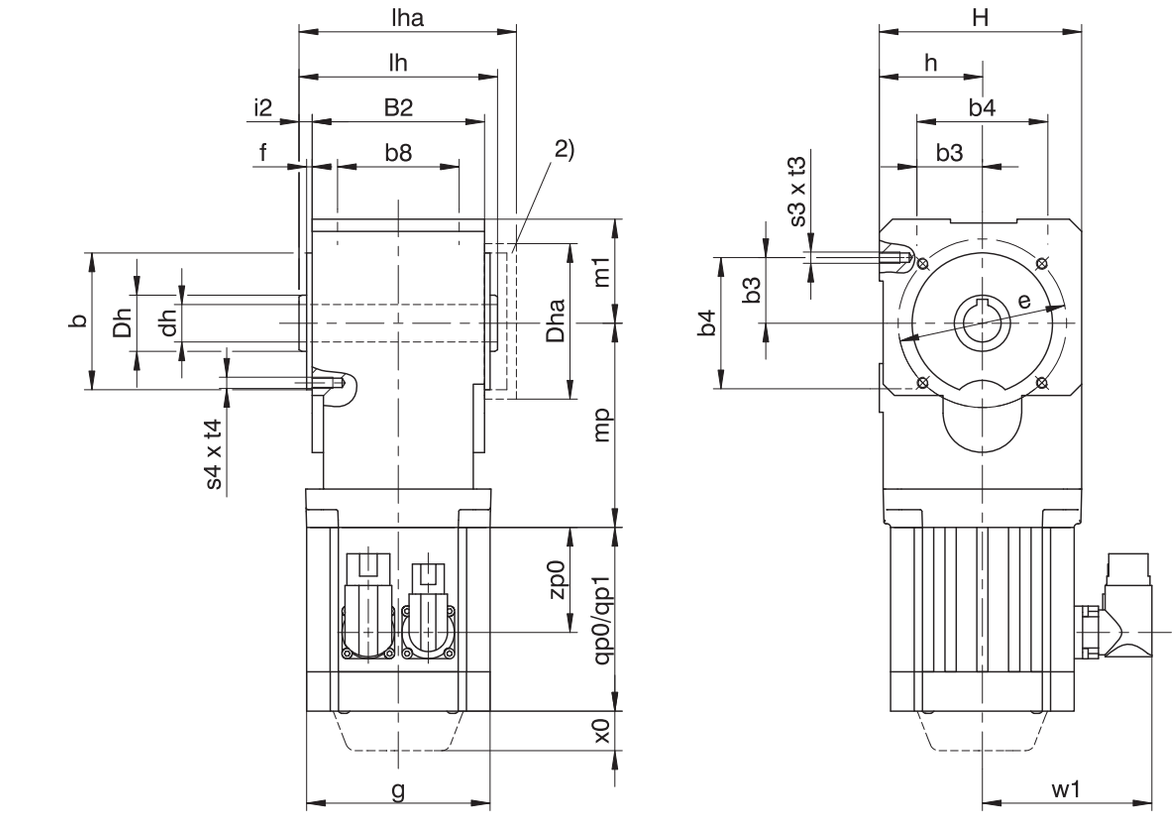
Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

Hollow shaft	Tolerance
Hollow shaft hole fit	ISO G7
Feather keys	DIN 6885-1, high form

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

15.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Øb	$b3$	$b4$	$b8$	$B2$	Ødh	Dh	Dha	Øe	f	h	H	$i2$	le	lh	las	lha	$m1$	$s3$	$s4$	sm	sas	$t3$	$t4$	th	uh
KL1	60_{j6}	27.5	55	50	75	16^{H7}	25	70	75	3	46	90	6	60.5	87	12	91	46	M6	M6	M5	M6	11	11	18.3	5^{JS9}
KL2	75_{j6}	35.0	70	65	92	20^{H7}	30	80	90	3	55	108	7	79.5	106	12	110	55	M6	M6	M6	M8	13	13	22.8	6^{JS9}

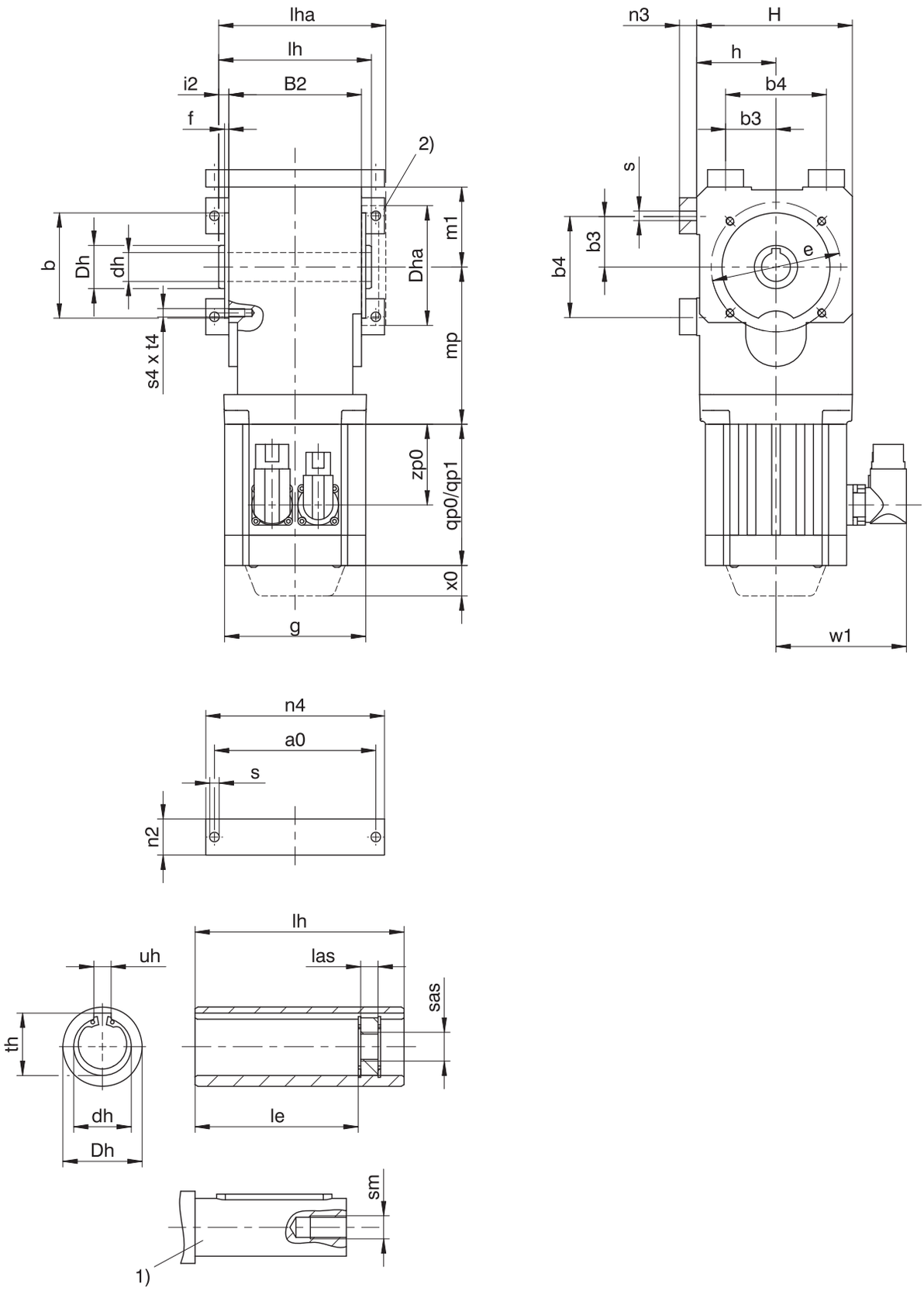
Dimensions of motors

Type	□g	$qp0$	$qp1$	$w1$	$x0$	$zp0$
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.2 A shaft design (hollow shaft), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ødh	Dh	Dha	Øe	f	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	Øs	s4	sm	sas	t4	th	uh
KL1	95	60_{j6}	27.5	55	75	16^{H7}	25	70	75	3	46	90	6	60.5	87	12	91	46	20	12	107	6.6	M6	M5	M6	11	18.3	5^{JS9}
KL2	112	75_{j6}	35.0	70	92	20^{H7}	30	80	90	3	55	108	7	79.5	106	12	110	55	25	12	124	6.6	M6	M6	M8	13	22.8	6^{JS9}

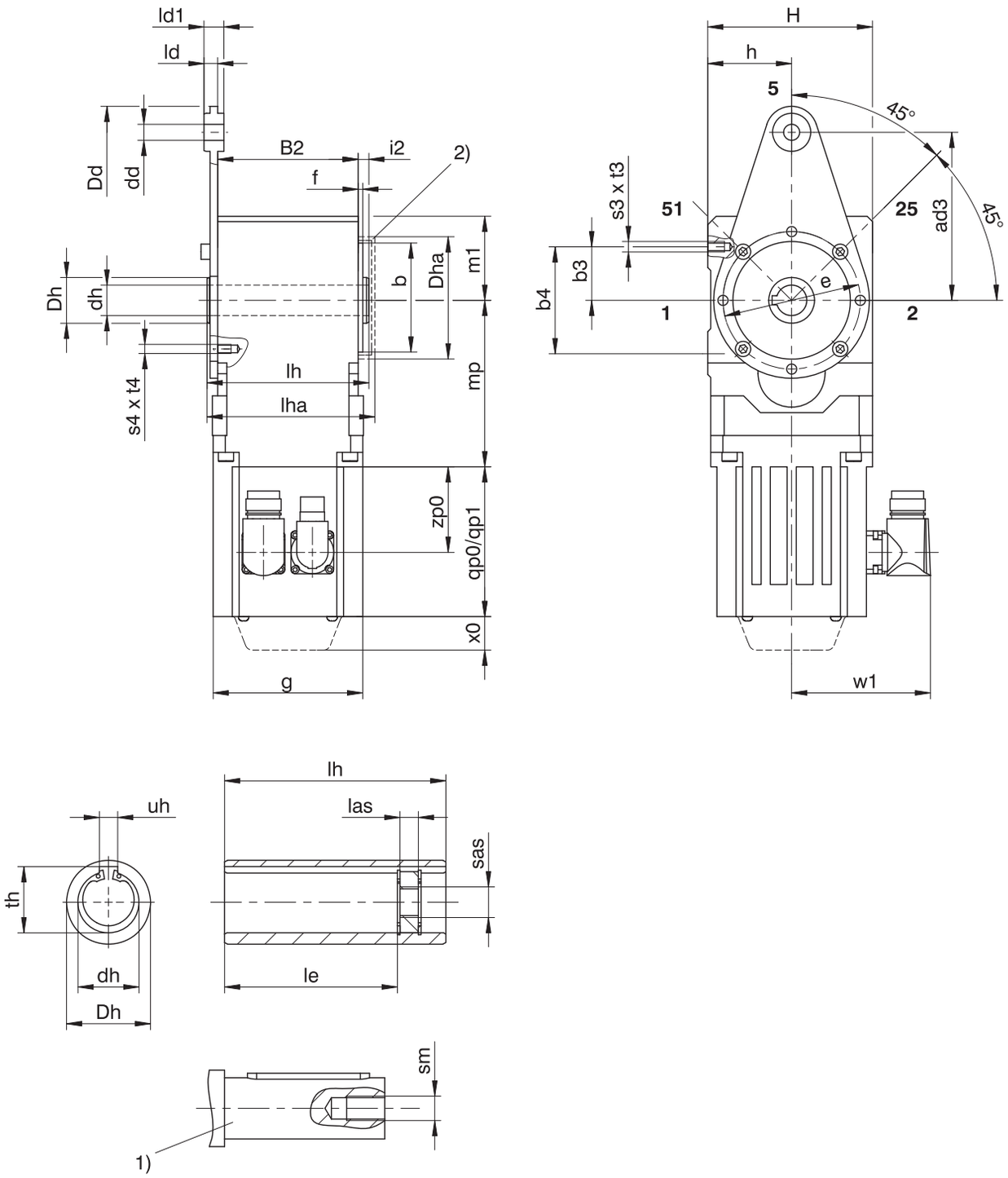
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.3 Shaft design A (hollow shaft), housing design GD (pitch circle diameter + torque arm bracket)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	ad3	Øb	b3	b4	B2	Ødd	Ødh	ØDd	ØDh	ØDha	Øe	f	h	H	i2	le	lh	las	ld	ld1	lha	m1	s3	s4	sm	sas	t3	t4	th	uh
KL2	110	75_{j6}	35	70	92	10.5	20^{H7}	34	30	80	90	3	55	108	7	79.5	106	12	9	13	110	55	M6	M6	M6	M8	13	13	22.8	6^{JS9}

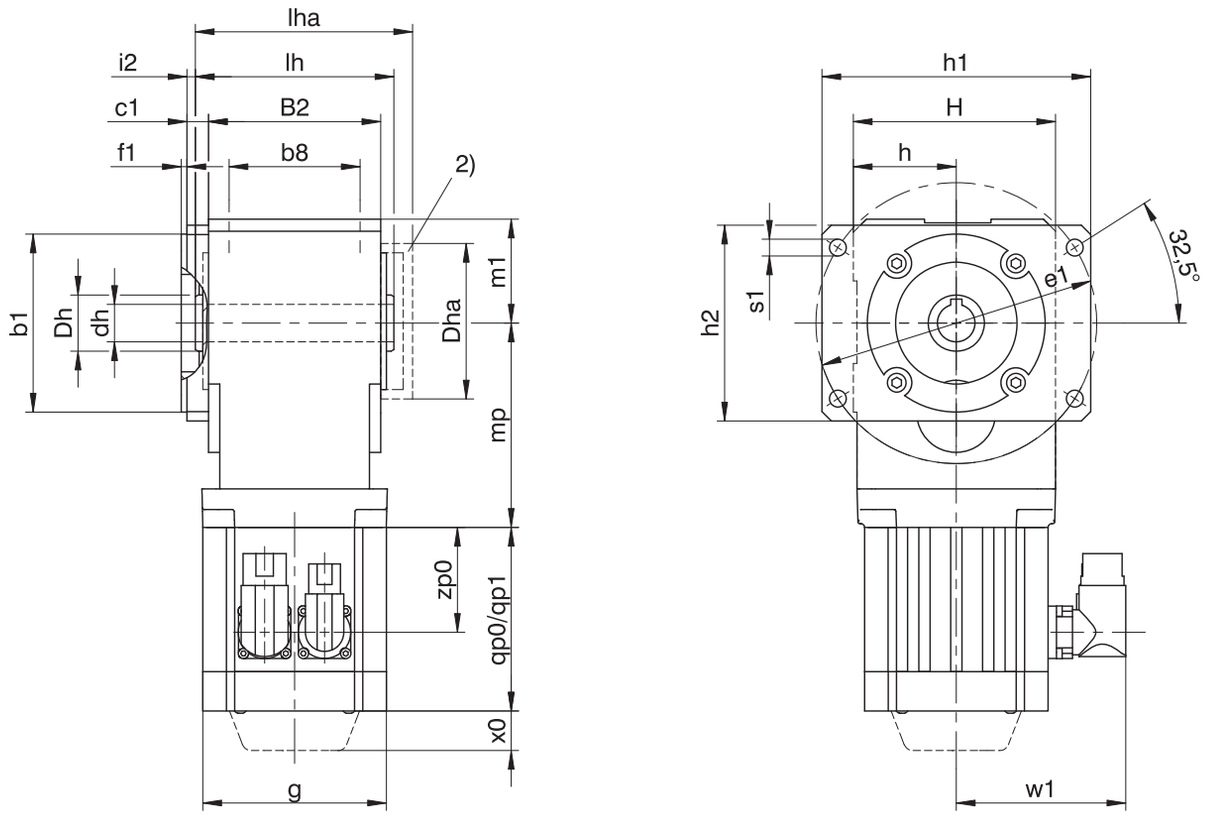
Dimensions of motors

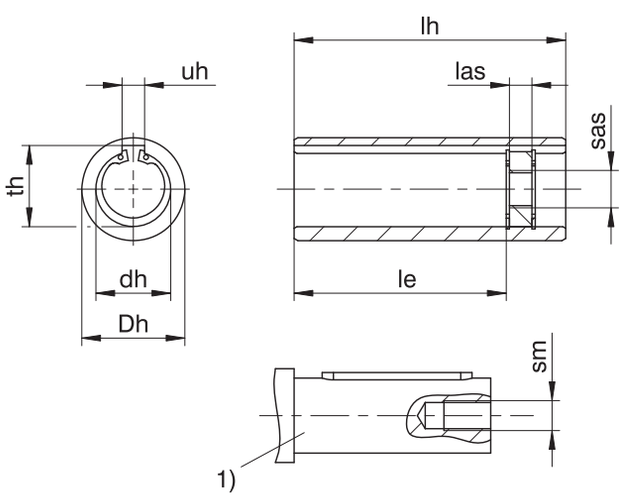
Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL202	112.5	109.0

15.3.4 A shaft design (hollow shaft), F housing design (flange)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	The length of the machine shaft must be at least 2.2 x ∅dh and the length of the feather key must be at least 2 x ∅dh.	2)	Cover (optional)

Dimensions of gear units

Type	Ø$b1$	$b8$	$B2$	$c1$	Ødh	Dh	Dha	Ø$e1$	$f1$	h	$h1$	$h2$	H	$i2$	le	lh	las	lha	$m1$	Ø$s1$	sm	sas	th	uh
KL1	60_{j6}	50	75	11.5	16^{H7}	25	70	130	3	46	128.5	88.5	90	5.5	60.5	87	12	91	46	9	M5	M6	18.3	5^{JS9}
KL2	95_{j6}	65	92	11.5	20^{H7}	30	80	150	3	55	143.5	104.5	108	4.5	79.5	106	12	110	55	9	M6	M8	22.8	6^{JS9}

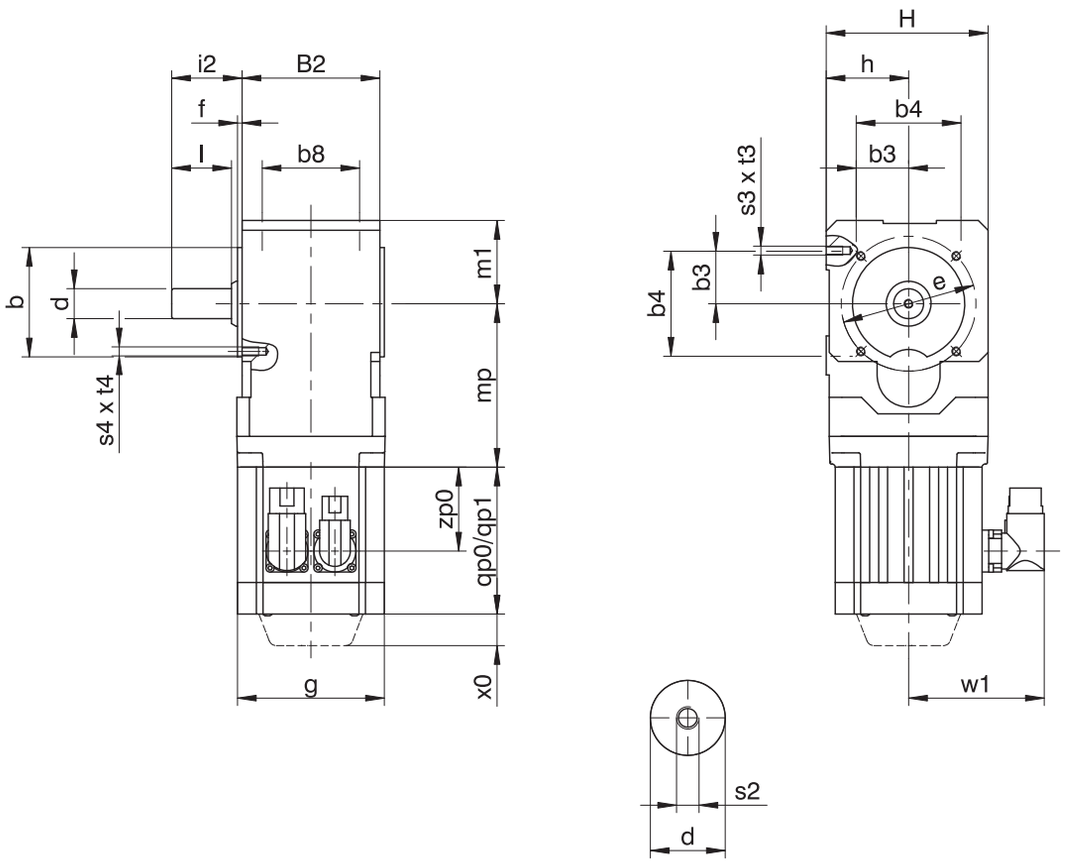
Dimensions of motors

Type	□g	$qp0$	$qp1$	$w1$	$x0$	$zp0$
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.5 G shaft design (solid shaft without feather key), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Øe	f	h	H	i2	l	m1	s2	s3	s4	t3	t4
KL1	60_{j6}	27.5	55	50	75	16_{k6}	75	3	46	90	38	32	46	M5	M6	M6	11	11
KL2	75_{j6}	35.0	70	65	92	20_{k6}	90	3	55	108	47	40	55	M6	M6	M6	13	13

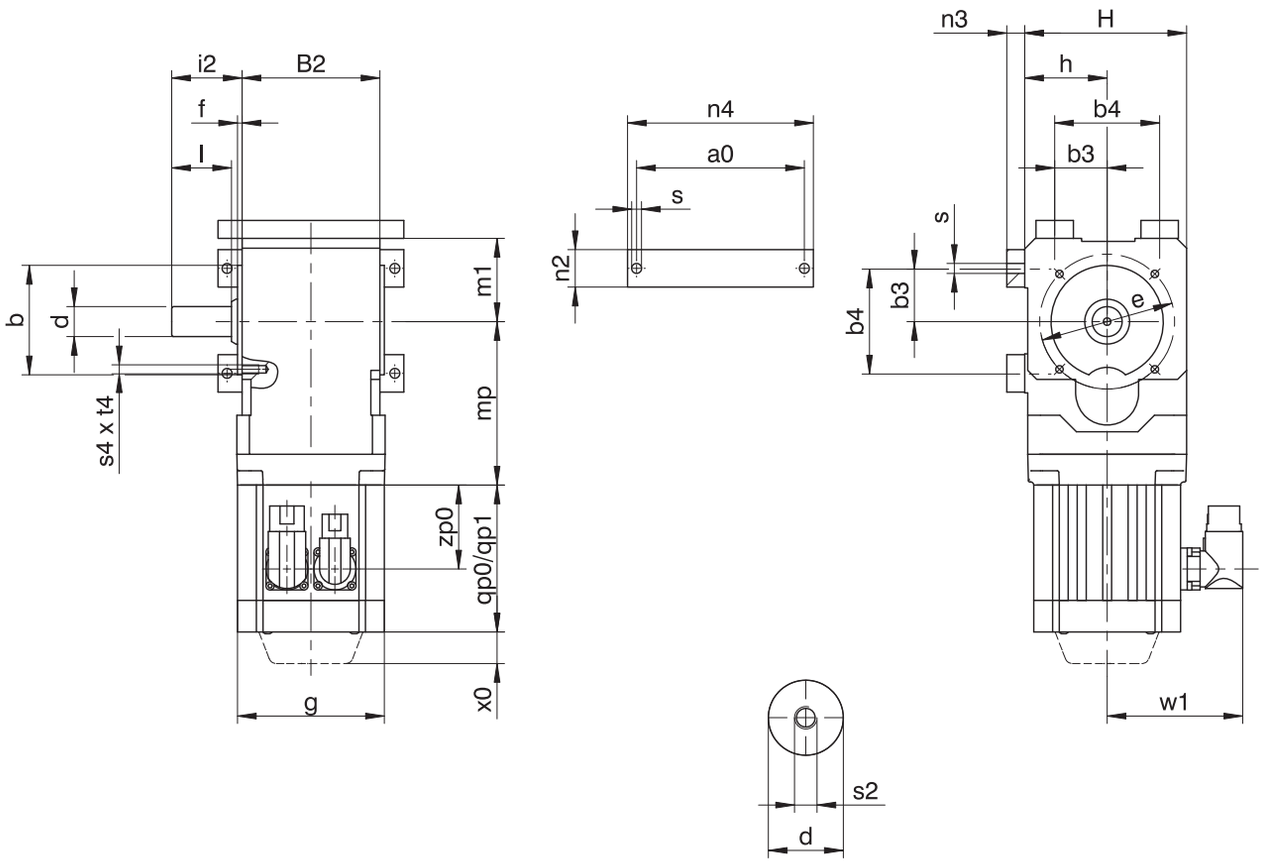
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2 mp	EZ3 mp	EZ4 mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.6 G shaft design (solid shaft without feather key), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ød	Øe	f	h	H	i2	l	m1	n2	n3	n4	Øs	s2	s4	t4
KL1	95	60_{j6}	27.5	55	75	16_{k6}	75	3	46	90	38	32	46	20	12	107	6.6	M5	M6	11
KL2	112	75_{j6}	35.0	70	92	20_{k6}	90	3	55	108	47	40	55	25	12	124	6.6	M6	M6	13

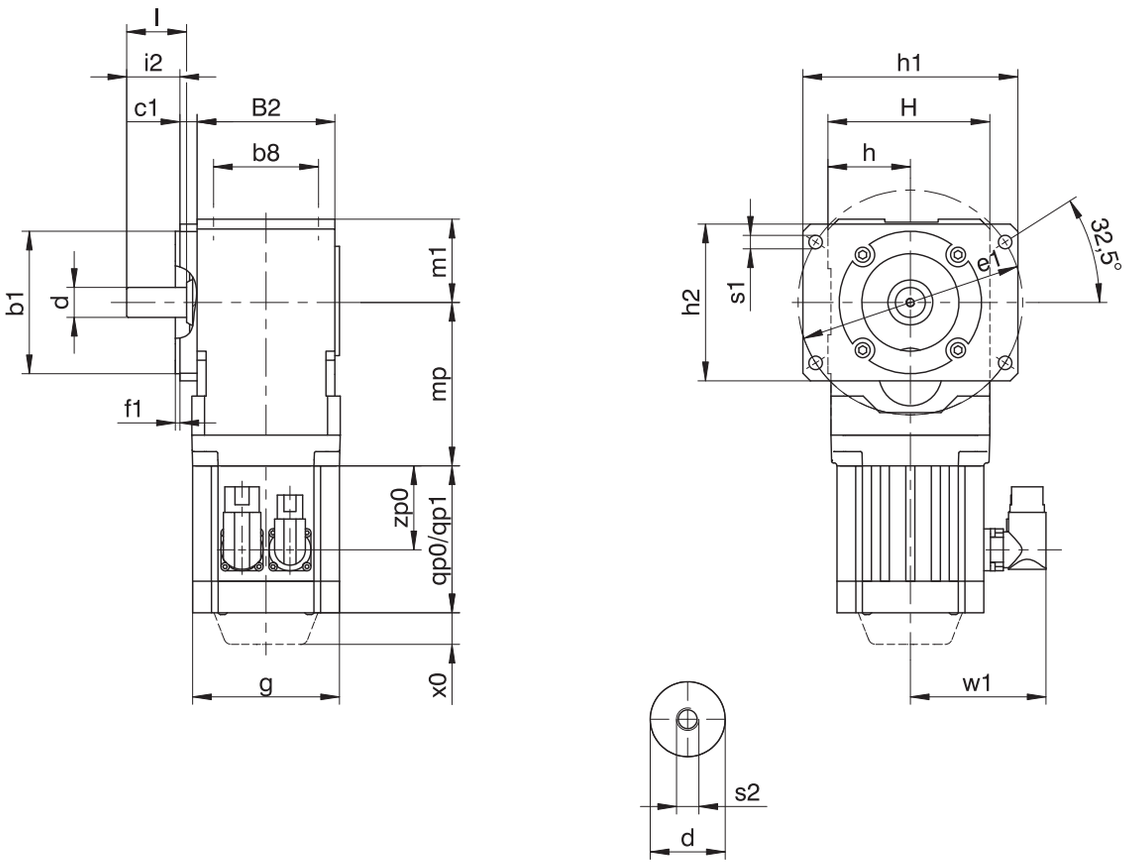
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2 mp	EZ3 mp	EZ4 mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.7 G shaft design (solid shaft without feather key), F housing design (flange)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	Øb1	b8	B2	c1	Ød	Øe1	f1	h	h1	h2	H	i2	l	m1	Øs1	s2
KL1	60_{j6}	50	75	11.5	16_{k6}	130	3	46	128.5	88.5	90	26.5	32	46	9	M5
KL2	95_{j6}	65	92	11.5	20_{k6}	150	3	55	143.5	104.5	108	35.5	40	55	9	M6

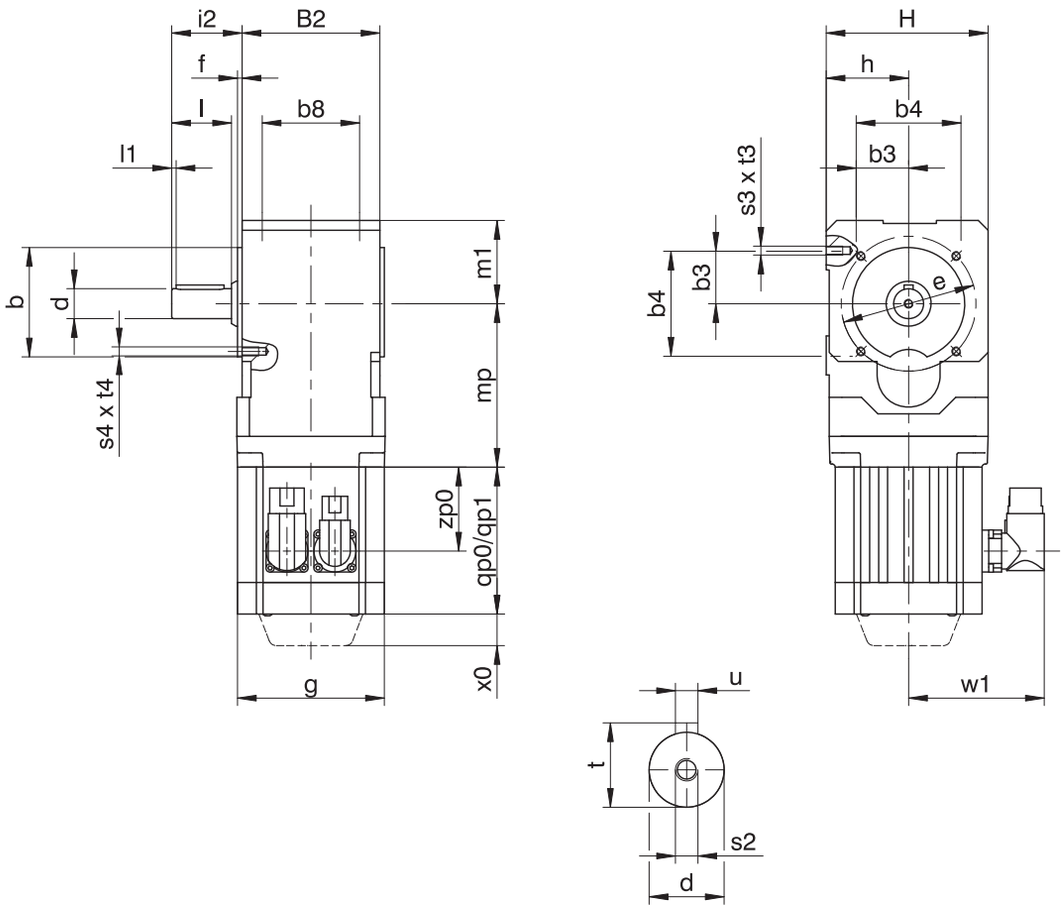
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.8 P shaft design (solid shaft with feather key), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Øe	f	h	H	i2	l	l1	m1	s2	s3	s4	t	t3	t4	u
KL1	60_{j6}	27.5	55	50	75	16_{k6}	75	3	46	90	38	32	3	46	M5	M6	M6	18	11	11	A5×5×22
KL2	75_{j6}	35.0	70	65	92	20_{k6}	90	3	55	108	47	40	3	55	M6	M6	M6	22.5	13	13	A6×6×32

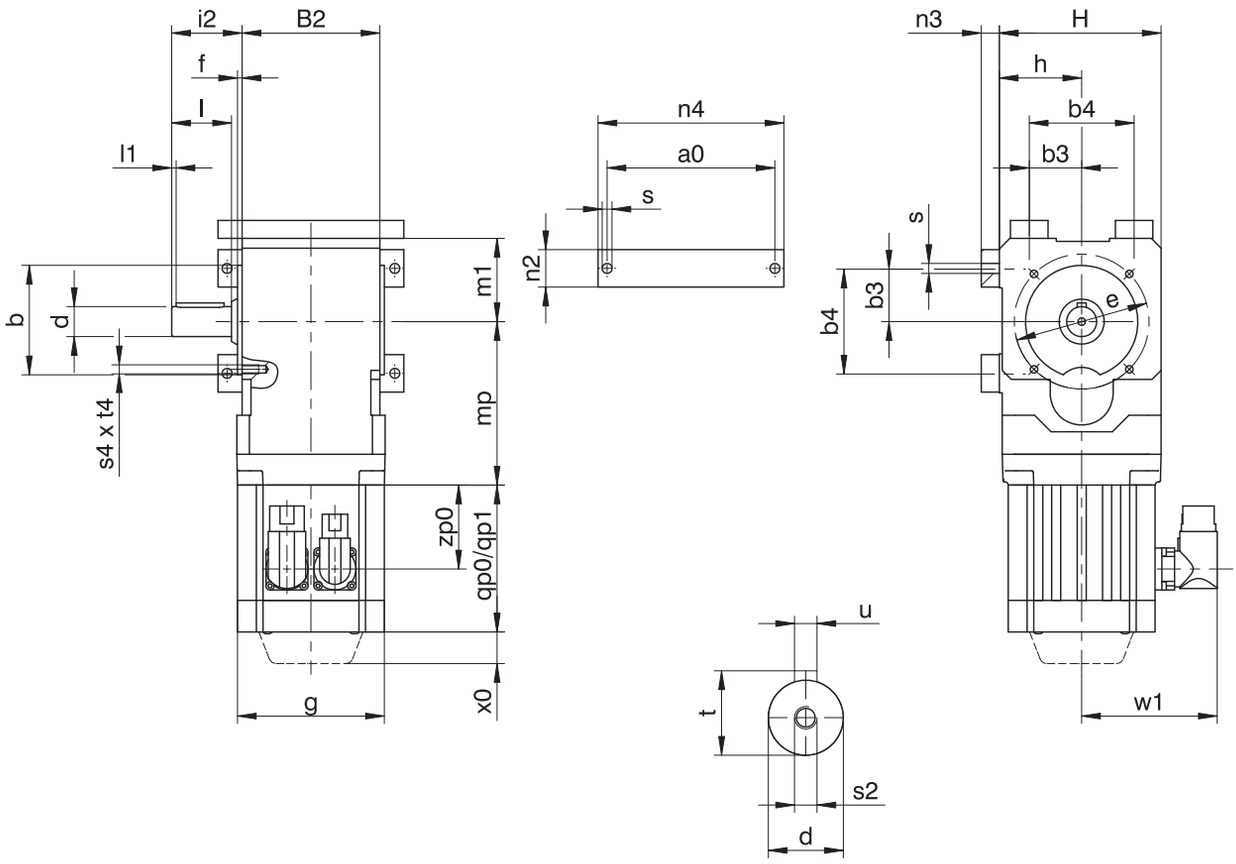
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.9 P shaft design (solid shaft with feather key), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ød	Øe	f	h	H	i2	l	l1	m1	n2	n3	n4	Øs	s2	s4	t	t4	u
KL1	95	60_{j6}	27.5	55	75	16_{k6}	75	3	46	90	38	32	3	46	20	12	107	6.6	M5	M6	18.0	11	A5×5×22
KL2	112	75_{j6}	35.0	70	92	20_{k6}	90	3	55	108	47	40	3	55	25	12	124	6.6	M6	M6	22.5	13	A6×6×32

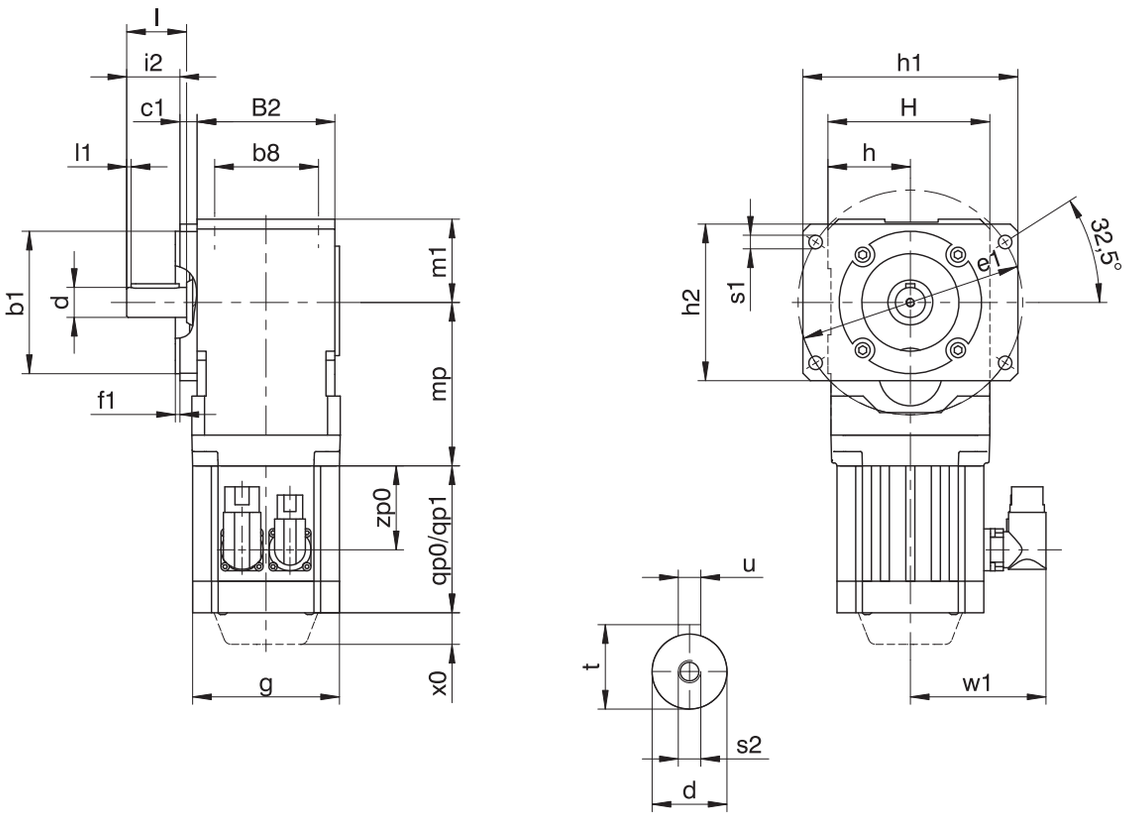
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2 mp	EZ3 mp	EZ4 mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.10 P shaft design (solid shaft with feather key), F housing design (flange)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]

Dimensions of gear units

Type	Ø$b1_{j6}$	b8	B2	c1	Ød_{k6}	Øe1	f1	h	h1	h2	H	i2	l	l1	m1	Øs1	s2	t	u
KL1	60_{j6}	50	75	11.5	16_{k6}	130	3	46	128.5	88.5	90	26.5	32	3	46	9	M5	18.0	A5×5×22
KL2	95_{j6}	65	92	11.5	20_{k6}	150	3	55	143.5	104.5	108	35.5	40	3	55	9	M6	22.5	A6×6×32

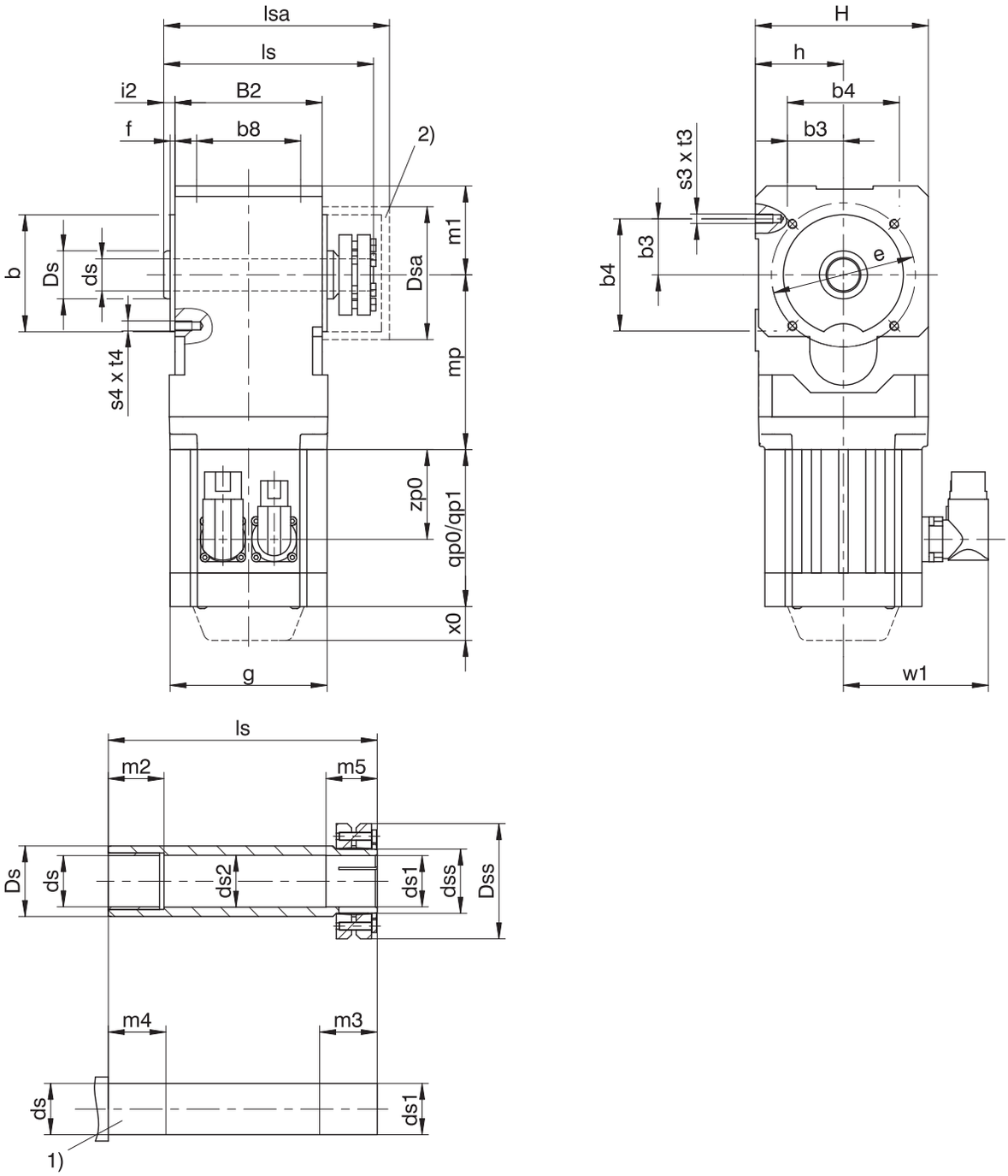
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2 mp	EZ3 mp	EZ4 mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.11 S shaft design (hollow shaft with shrink disk), G housing design (pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Øb	b3	b4	b8	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
KL1	60_{j6}	27.5	55	50	75	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	75	3	46	90	6	109	114.5	46	17	22	28	23	M6	M6	11	11
KL2	75_{j6}	35.0	70	65	92	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	90	3	55	108	7	131	139.0	55	22	27	31	26	M6	M6	13	13

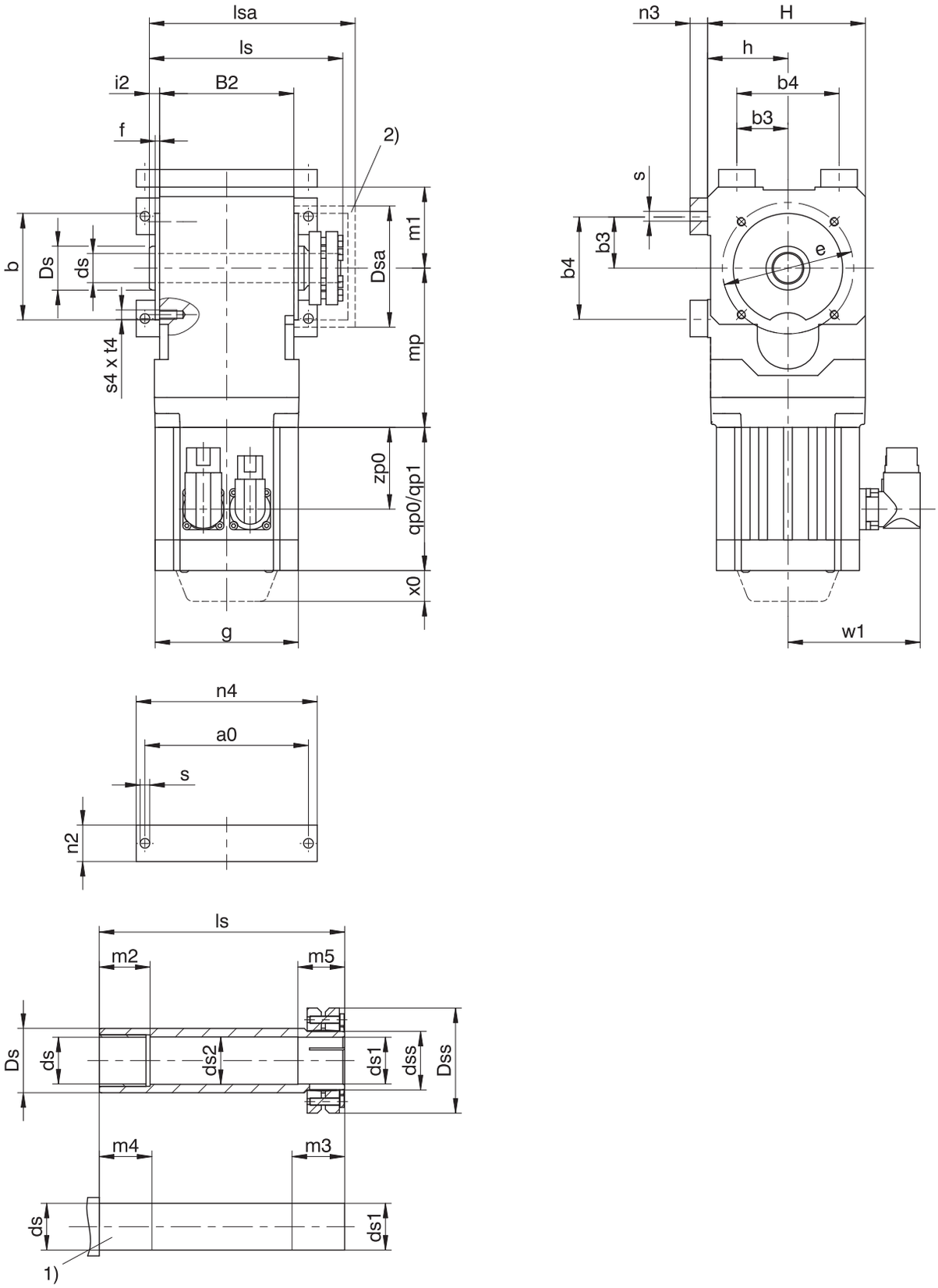
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.12 S shaft design (hollow shaft with shrink disk), NG housing design (base + pitch circle diameter)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	a0	Øb	b3	b4	B2	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	Øs	s4	t4
KL1	95	60_{j6}	27.5	55	75	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	75	3	46	90	6	109	114.5	46	17	22	28	23	20	12	107	6.6	M6	11
KL2	112	75_{j6}	35.0	70	92	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	90	3	55	108	7	131	139.0	55	22	27	31	26	25	12	124	6.6	M6	13

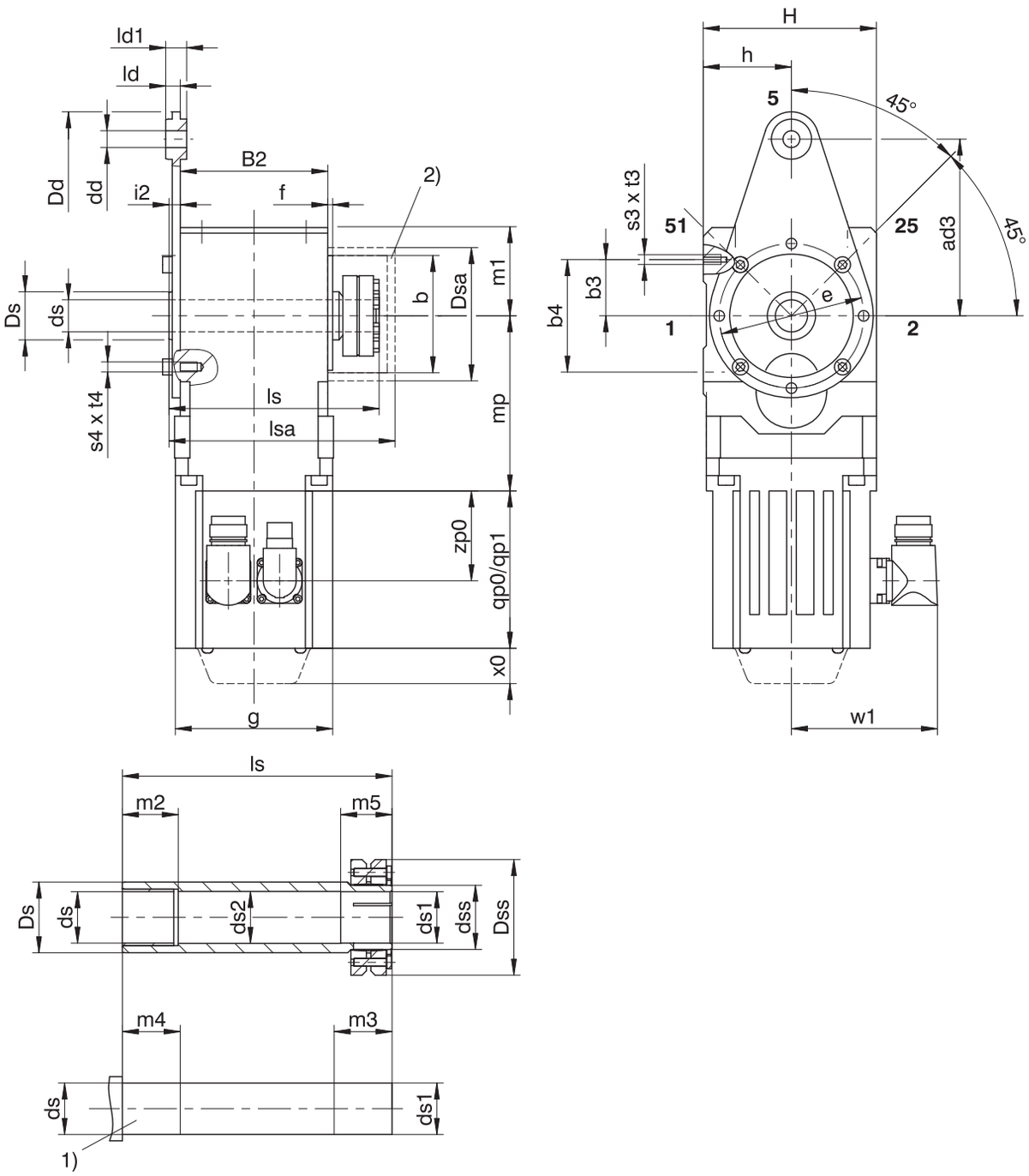
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.3.13 Shaft design S (hollow shaft with shrink ring), housing design GD (pitch circle diameter + torque arm bracket)



qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	ad3	Øb	b3	b4	B2	Ødd	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
KL2	110	75_{j6}	35	70	92	10.5	20^{H7}	20_{h6}^{H7}	21.5	24	30	79	50	90	3	55	108	7	9	13	131	139.0	55	22	27	31	26	M6	M6	13	13

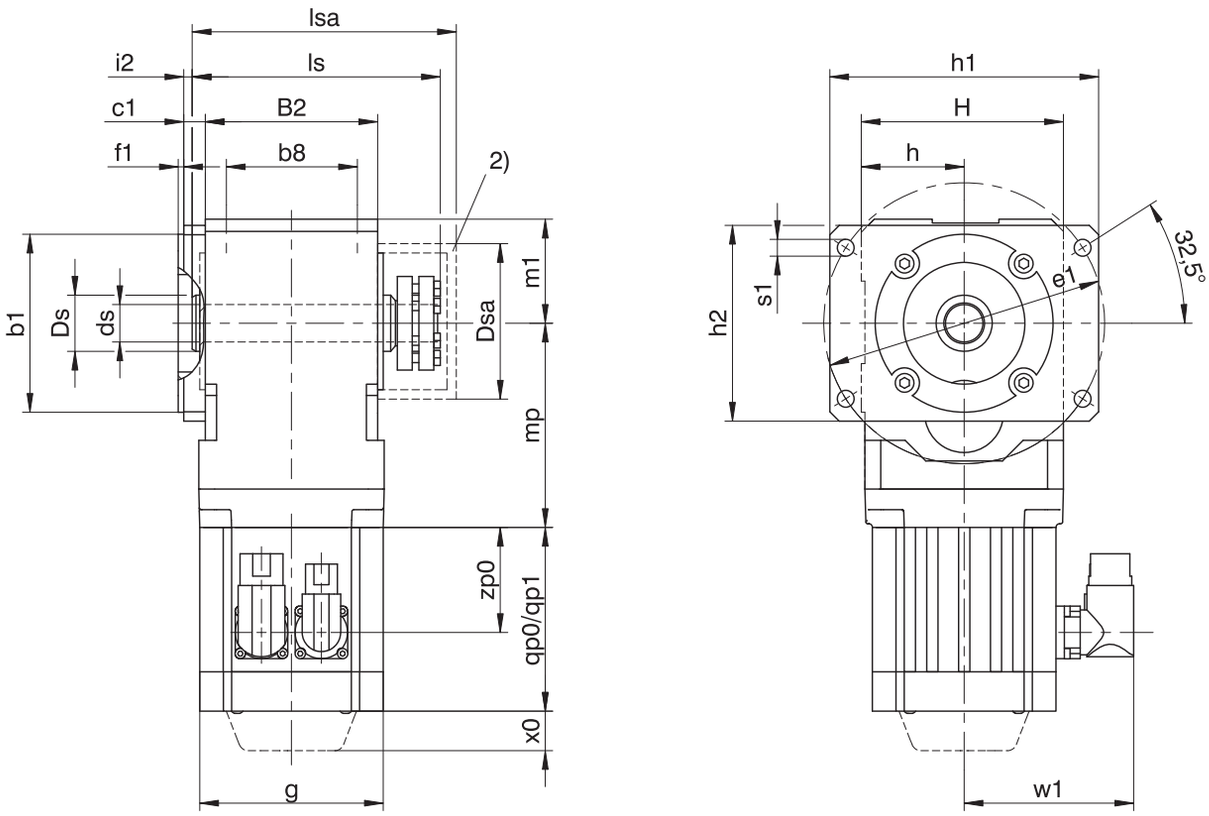
Dimensions of motors

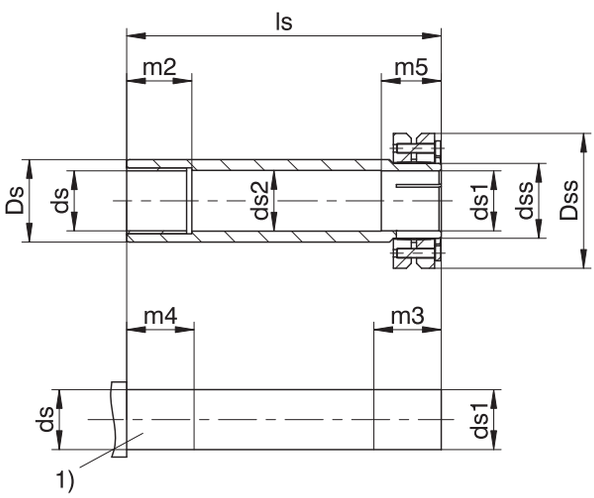
Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ3	EZ4
	mp	mp
KL202	112.5	109.0

15.3.14 S shaft design (hollow shaft with shrink disk), F housing design (flange)





qp0	Applies to motors without brake.	qp1	Applies to motors with brake.
x0	EZ2: Applies only to motors with brake and encoders using an optical or inductive measuring method EZ3 – EZ8: Applies to encoders using an optical measuring method	w1	Different for the One Cable Solution (OCS), see the chapter [▶ 17.4]
1)	Machine shaft: The dimension ls must meet or exceed the specified value.	2)	Cover (optional)

Dimensions of gear units

Type	Ød1	b8	B2	c1	Ød	Ød1	Ød2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	h1	h2	H	i2	ls	lsa	m1	m2	m3	m4	m5	Øs1
KL1	60_{j6}	50	75	11.5	16^{H7}	$16_{h6}{}^{H7}$	17.5	20	25	64	46.2	130	3	46	128.5	88.5	90	5.5	109	114.5	46	17	22	28	23	9
KL2	95_{j6}	65	92	11.5	20^{H7}	$20_{h6}{}^{H7}$	21.5	24	30	79	50.0	150	3	55	143.5	104.5	108	4.5	131	139.0	55	22	27	31	26	9

Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ202U	55	141	150.0	47.0	25	86.0
EZ203U	55	159	168.0	47.0	25	104.0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0

Dimensions of geared motors

Type	EZ2	EZ3	EZ4
	mp	mp	mp
KL102	78.5	95.5	–
KL202	–	112.5	109.0

15.4 Type designation

This chapter shows you an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Example code

KL	2	0	2	P	G	0080	EZ401U

Explanation

Code	Designation	Design
KL	Type	Helical bevel gear unit
2	Size	2 (example)
0	Generation	Generation 0
2	Stages	Two-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
G		Solid shaft without feather key
P		Solid shaft with feather key
G	Housing	Pitch circle diameter
F		Flange
NG		Foot + pitch circle diameter
GD		Pitch circle diameter + torque arm bracket
0080	Transmission ratio (i x 10)	i = 8 (example)
EZ401U	Motor	EZ synchronous servo motor

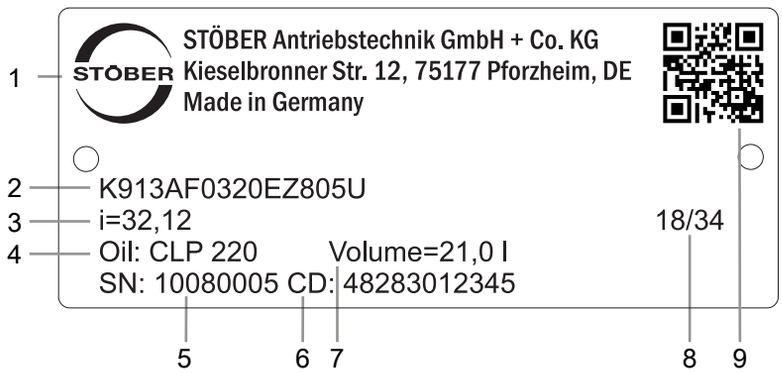
To complete the type designation, also specify the following in your order:

- A detailed type designation of the motor, see the chapter [▶ 17]
- Attachment of solid shaft: gear unit side 3 or 4; solid shaft on both sides
- Attachment of hollow shaft with keyway: insertion side 3 or 4
- Attachment of hollow shaft with shrink ring: shrink ring on gear unit side 3 or 4
- Attachment of foot plates: gear unit side 1 or 5
- Attachment of flange: gear unit side 3 or 4
- Pitch circle diameter: gear unit side 3 or 4
- The position of the plug connectors, see the chapter [▶ 15.5.7]

An explanation of the gear unit sides can be found in the chapter [▶ 15.5.5].

15.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	Customer-specific data
7	Lubricant fill volume
8	Date of manufacture (year/calendar week)
9	QR code (link to product information)

15.4.1.1 Supporting documents

You can view or download supporting documents for the product by reading off the serial number on the nameplate of the product and entering it at the following address online:
https://id.stober.com

Alternatively, you can use a suitable mobile device to scan in the QR code on the nameplate of the product in order to be linked to the supporting documents.

15.5 Product description

15.5.1 Input options

EZ synchronous servo motor

Catalog ID 442437_en

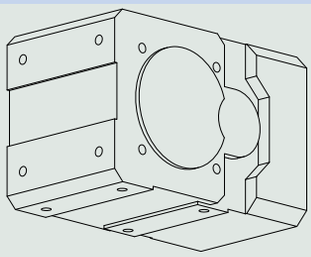
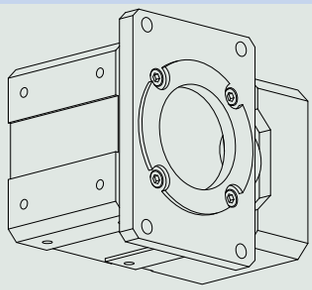
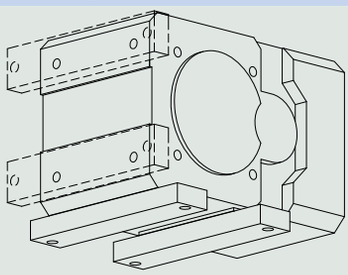
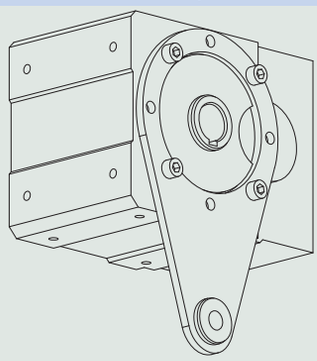
LM Lean motor

Catalog ID 443016_en

The corresponding catalogs can be found at http://www.stoeber.de/en/downloads/

Enter the ID of the catalog in the Search term field.

15.5.2 Housing design

Pitch circle diameter G	Flange F
	
Foot + pitch circle diameter NG	**Pitch circle diameter + torque arm bracket GD**
	

	G	F	NG	GD
KL1	✓	✓	✓	–
KL2	✓	✓	✓	✓

15.5.3 Combinatorial shaft/housing design

	Housing design				
Shaft design	**Code**	**G**	**F**	**NG**	**GD**
Hollow shaft with keyway	**A**	AG	AF	ANG	AGD
Hollow shaft with shrink ring	**S**	SG	SF	SNG	SGD
Solid shaft without feather key	**G**	GG	GF	GNG	–
Solid shaft with feather key	**P**	PG	PF	PNG	–

15.5.4 Installation conditions

Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h9.

Select a material for the machine shaft with a permitted surface pressure of $p \geq 325\ N/mm^2$.

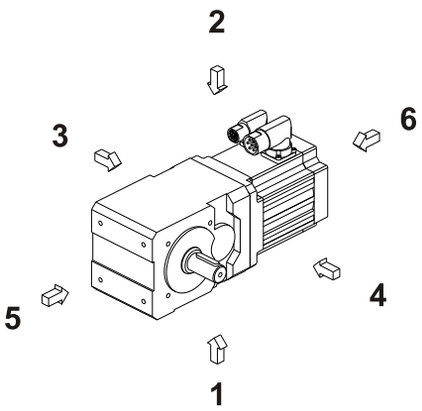
Possible materials:

- C45E +QT
- 42CrMo4

Fastening the gear units on the machine side using the pitch circle diameter

The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 10.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

15.5.5 Gear unit sides



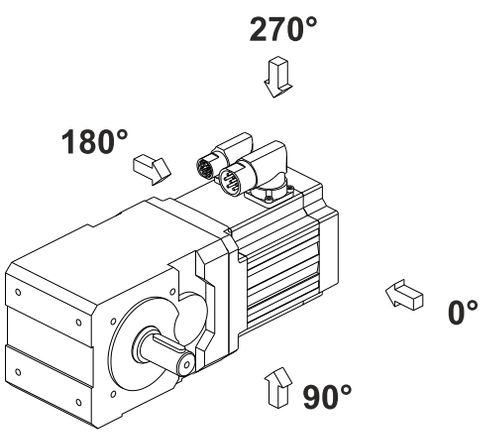
The numbers identify the gear unit sides.

15.5.6 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

You will receive lubricants for use in the food industry upon request.

15.5.7 Position of the plug connectors



In the standard version, the plug connectors are attached in the 270° position.

Indicate variations for your geared motor in the order.

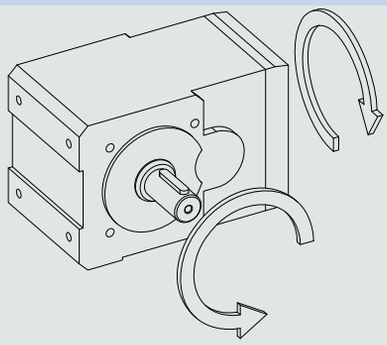
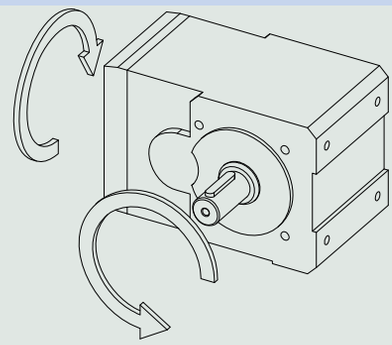
15.5.8 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
Efficiency:	
η_{get} two-stage	97%
Protection class:[1]	
Gear unit	IP65
Motor	IP56, optionally IP66

[1] Observe the protection class of all the components.

15.5.9 Direction of rotation

Solid shaft (P and G), solid shaft on both sides (P and G), hollow shaft with keyway (A)

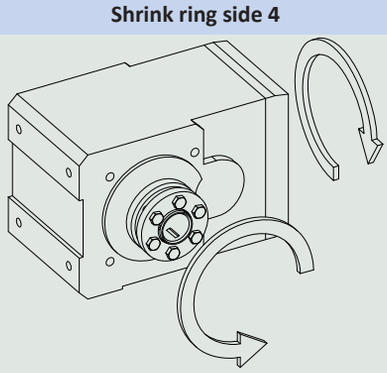
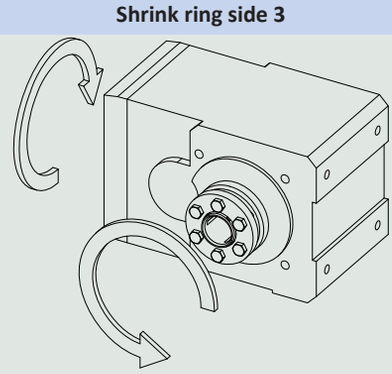
Output side 4	Output side 3
	

The specified directions of rotation also apply to gear units with hollow shaft (A) if the entry side of the machine shaft corresponds to the side of the solid shaft that is shown.

The direction of rotation for the shaft design of a solid shaft on both sides corresponds to the direction of rotation for output side 4.

The pictures show mounting position EL1.

Hollow shaft with shrink ring (S)

Shrink ring side 4	Shrink ring side 3
	

The pictures show mounting position EL1.

15.6 Project configuration

Project your drives using our SERVOsoft designing software. Download SERVOsoft for free at https://www.stoeber.de/en/ServoSoft.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

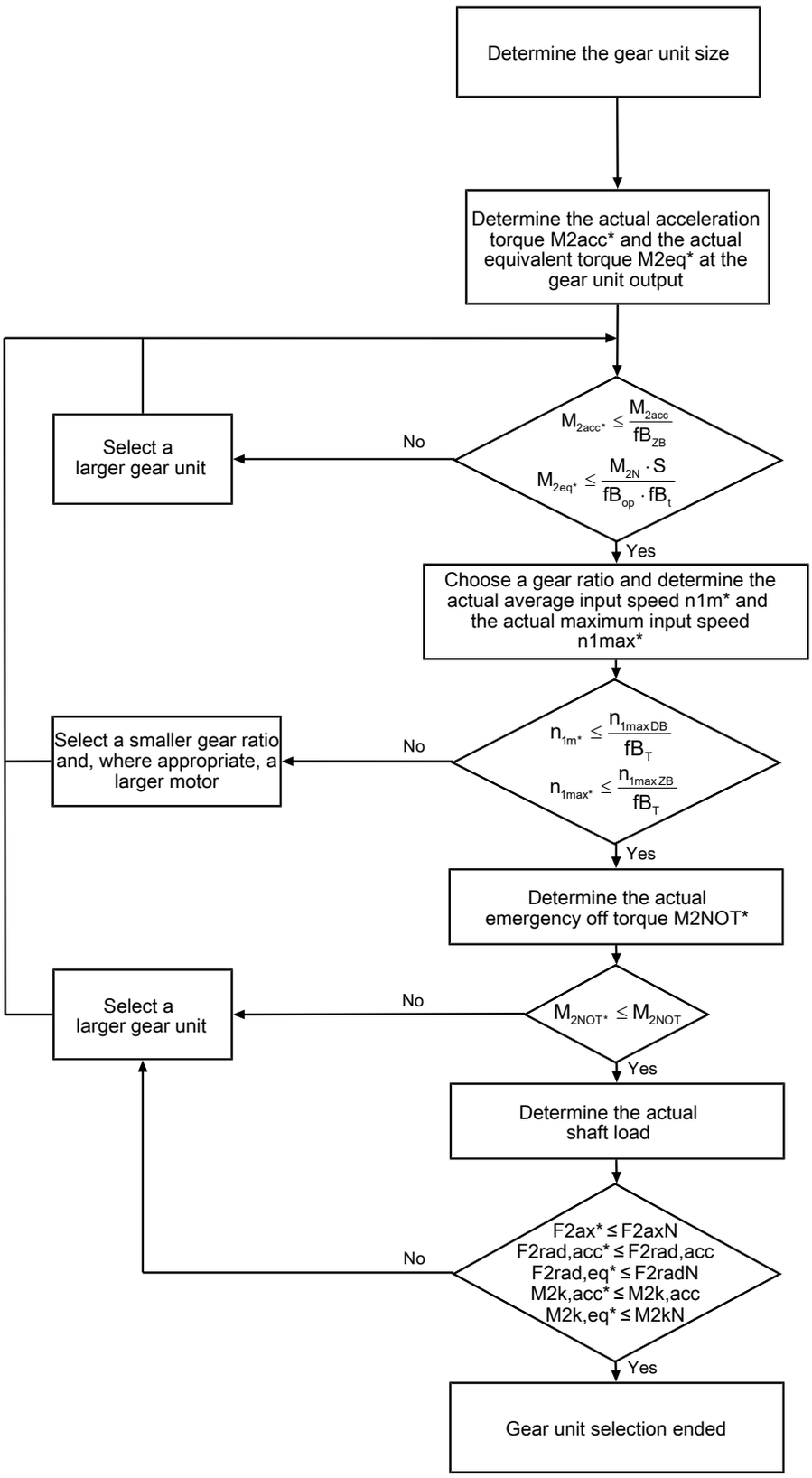
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in Chapter [▷ 20.1].

The formula symbols for values actually present in the application are marked with *.

15.6.1 Drive selection

Drive selection for gear units

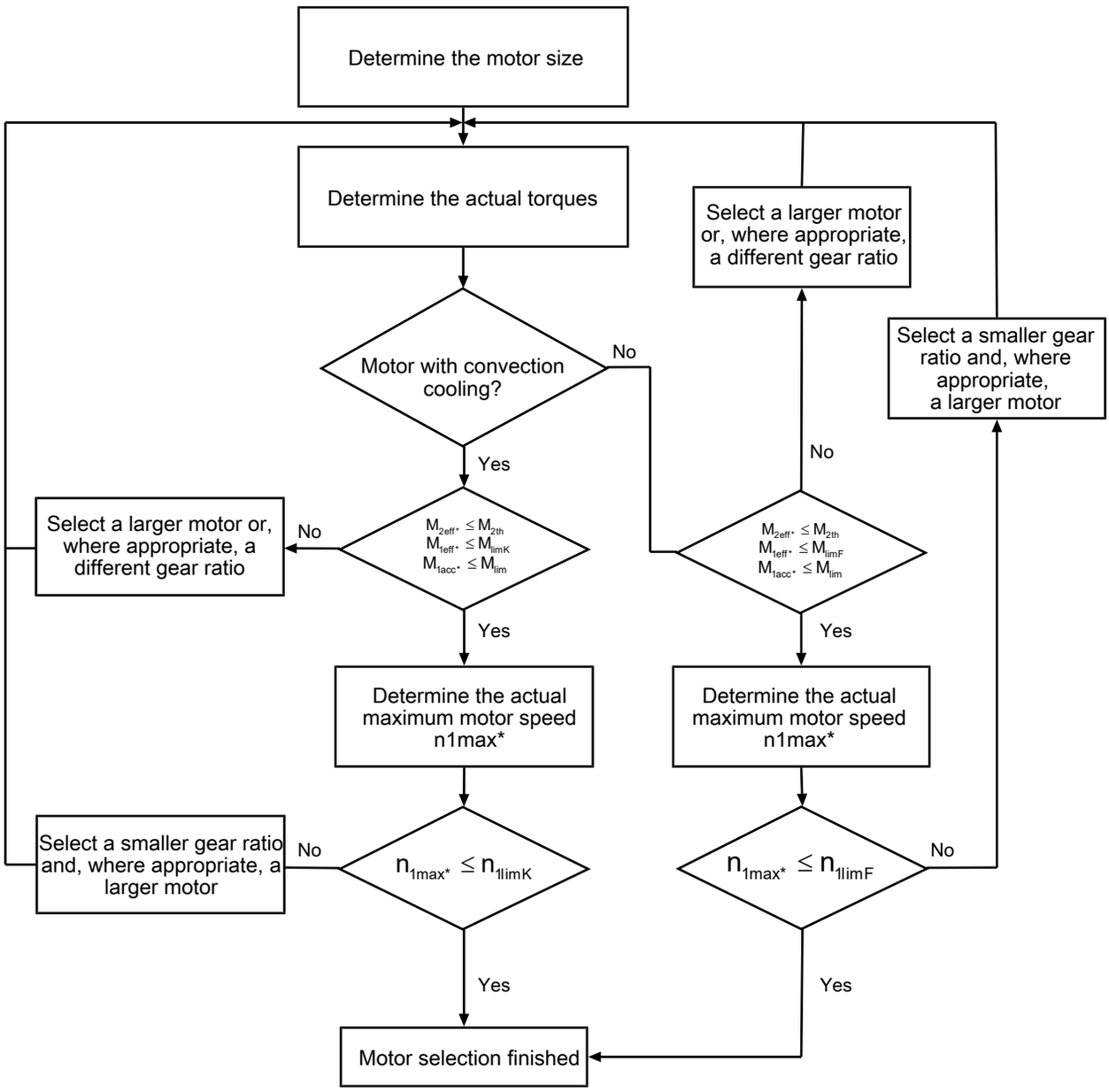


Calculate the forces and tilting torques in the chapter Permitted shaft loads.

Refer to the selection tables for the values for i, n_{1maxDB}, n_{1maxZB}, M_{2acc}, M_{2NOT}, M_{2N} and S.

The values for fB_T, fB_{op}, fB_t and fB_{ZB} can be found in the corresponding tables in this chapter.

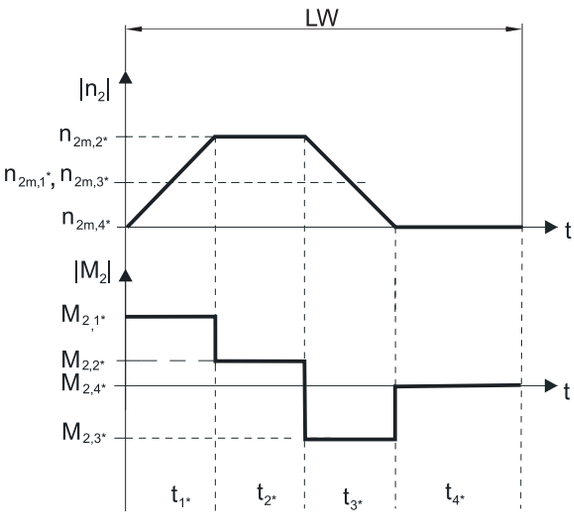
Drive selection for motors



The value for M_{lim}, M_{limK}, M_{limF}, n_{1limK} and n_{1limF} can be found in the motor characteristic curve in the chapter [▶ 17.3]. Note the size, nominal speed n_N and cooling type of the motor.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual maximum acceleration torques

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9{,}55 \cdot \Delta t} + M_{L*}$$

$$M_{1acc*} = \frac{M_{2acc*}}{i \cdot \eta_{get}} + J_1 \cdot \frac{\Delta n_1}{9{,}55 \cdot \Delta t}$$

Calculation of the actual average input speed

$$n_{1m*} = n_{2m*} \cdot i$$

$$n_{2m*} = \frac{\left|n_{2m,1*}\right| \cdot t_{1*} + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*}}{t_{1*} + \ldots + t_{n*}}$$

If $t_{1*} + \ldots + t_{3*} \geq 6$ min, calculate n_{2m*} without the rest phase t_{4*}.

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff*} = \sqrt{\frac{t_{1*} \cdot M_{2,1*}{}^2 + \ldots + t_{n*} \cdot M_{2,n*}{}^2}{t_{1*} + \ldots + t_{n*}}}$$

Calculation of the actual emergency-off torque

$$M_{2NOT*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

Calculation of the actual equivalent torque

$$M_{2eq*} = \sqrt[3]{\frac{\left|n_{2m,1*}\right| \cdot t_{1*} \cdot \left|M_{2,1*}{}^3\right| + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*} \cdot \left|M_{2,n*}{}^3\right|}{\left|n_{2m,1*}\right| \cdot t_{1*} + \ldots + \left|n_{2m,n*}\right| \cdot t_{n*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{10} > 50\%$ and the actual average input speed n_{1m*}. (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m*} accordingly or select another geared motor size.)

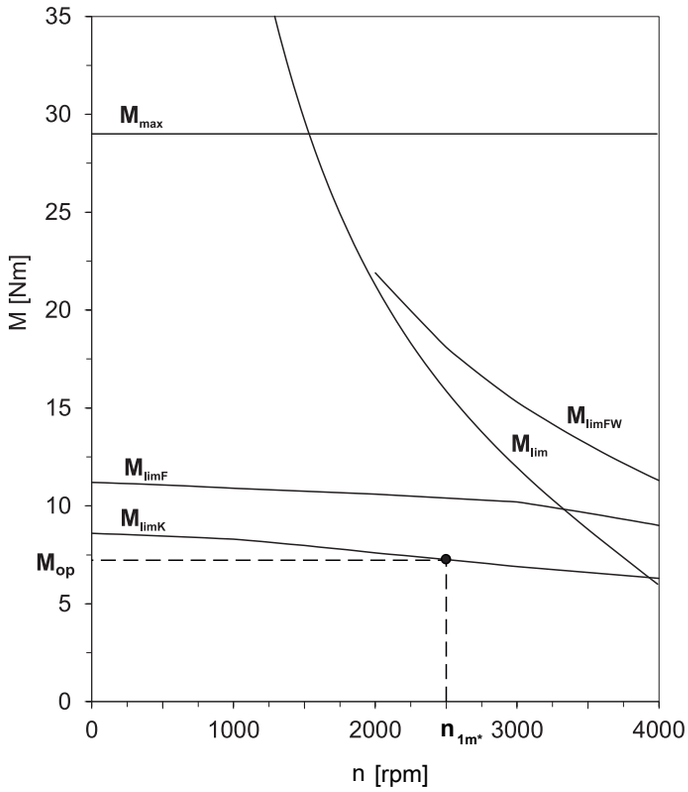
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0{,}9 - \frac{a_{th}}{1000} \cdot fB_T \cdot \left(\frac{n_{1m*}}{1000}\right)^2$$

Refer to the selection tables for the values of i and a_{th}.

The values for fB_T can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor characteristic curve in the chapter [▶ 17.3]. Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Operating mode	fB_{op}
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	fB_t
Daily runtime ≤ 8 h	1.00
Daily runtime ≤ 16 h	1.15
Daily runtime ≤ 24 h	1.20

Cyclic operation	fB_{ZB}
≤ 1000 load changes/hour (LW/h)	1.00
> 1000 load changes/hour (LW/h)	1.15

Temperature		fB_T
Motor cooling	**Surrounding temperature**	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc}, M_{2NOT}) in the selection tables.

15.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F^{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

15.6.2.1 G and P shaft designs

Permitted shaft loads for G and P shaft designs (solid shaft)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
KL1	20.0	380	1900	1900	68	68
KL2	22.0	560	2800	2800	118	118

For other output speeds, download diagrams at https://configurator.stoeber.de/en-US/.

The following applies to output speeds $n_{2m*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ \text{rpm}}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

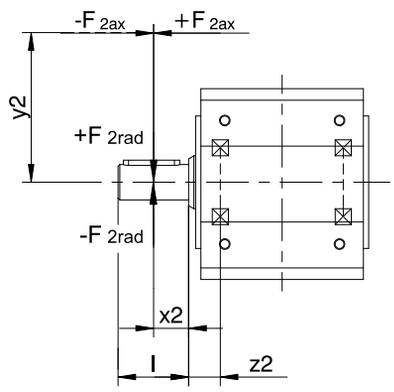


Fig. 1: Force application points for solid shaft

The specified values for $F_{2rad100}$ refer to force application on the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \ldots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \ldots + |n_{2m,n^*}| \cdot t_{n^*}}}$$

15.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
KL1	18.5	250	1250	1250	43	43
KL2	22.0	560	2800	2800	118	118

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
KL1	18.5	250	1250	1250	43	43
KL2	22.0	560	2800	2800	118	118

For other output speeds, download diagrams at https://configurator.stoeber.de/en-US/.

The following applies to output speeds n_{2m*} > 100 rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}} \qquad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m*}}{100\ rpm}}}$$

The values for F_{2ax100}, $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

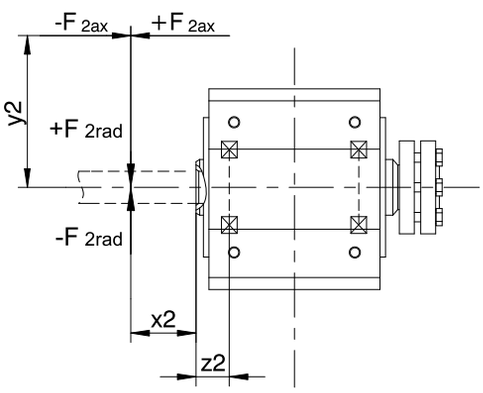


Fig. 2: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted tilting torque M_{2kN} and $M_{2k,acc}$. The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end (x2 = 0).

$$M_{2k,acc*} = \frac{2 \cdot F_{2ax*} \cdot y_2 + F_{2rad,acc*} \cdot (x_2 + z_2)}{1000}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax20}, F_{2rad20} and M_{2k20} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |M_{2k,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |M_{2k,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}}$$

$$F_{2rad,eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot |F_{2rad,acc,1*}^{\ 3}| + \ldots + |n_{2m,n*}| \cdot t_{n*} \cdot |F_{2rad,acc,n*}^{\ 3}|}{|n_{2m,1*}| \cdot t_{1*} + \ldots + |n_{2m,n*}| \cdot t_{n*}}}$$

15.6.3 Radial shaft seal rings

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

15.7 Additional documentation

Additional documentation related to the product can be found at
http://www.stoeber.de/en/downloads/

Enter the ID of the documentation in the Search term field.

Documentation	ID
Operating manual gear units, geared motors KL	443363_en